DOCUMENT RESUME

ED 117 045 95 SP 009 738

AUTHOR Feldman, Robert S.; And Others
TITLE Two Field Studies on Cross-Age Tutoring in the School. Technical Report No. 361.
INSTITUTION Wisconsin Univ., Madison. Research and Development Center for Cognitive Learning.
SPONS AGENCY Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.; National Inst. of Education (DHEW), Washington, D.C.
REPORT NO TR-361
PUB DATE Nov 75
CONTRACT NE-C-00-3-0065
NOTE 28p.

EDRS PRICE MF-$0.76 HC-$1.95 Plus Postage
DESCRIPTORS Behavioral Science Research; Cross Age Teaching; Elementary Education; *Elementary School Students; Mathematics; *Peer Relationship; *Peer Teaching; Reading; Role Perception; Role Theory; *Self Concept; Self Concept Tests; Student Attitudes; *Tutoring

ABSTRACT

Two studies explored the effects of peer teaching on the attitudes and behavior of tutors and tutees. In the first study, fourth graders tutored third graders in reading once a day for two weeks. Another group befriended a third grader over the same period of time, supervising play activities. A control group participated in neither special situation. After the experiment, the children were evaluated through personal interviews and tests to determine how, if at all, their feelings about themselves, their teachers, and their academic progress had changed. Although all the subjects liked being in the experiment, and the tutees' reading improved, few significant differences were seen in experiment and control subjects. In the second study, fifth graders taught first graders symmetry concepts in math twice a week for six weeks. Again, others befriended the first graders and others were not placed in a pair. Tutees in this situation learned a good deal and developed more positive perceptions of their intellectual performance. First graders who had a friend enjoyed the relationship, but their self-perceptions did not change as a consequence. It was speculated that this was because being in a friend relationship was not enough of a new, concrete role to foster the changes that role theory would suggest. Tutors enjoyed the experience and learned the material they had to teach, but the experiment did not seem to affect their self-concepts very much. (CD)

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Technical Report No. 361

TWO FIELD STUDIES ON CROSS-AGE TUTORING IN THE SCHOOL

by

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Report from the Project on
Conditions of School Learning and Instructional Strategies

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November 1975

SP009 138

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
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The Wisconsin R&D Center is supported with funds from the National Institute of Education; the Bureau of Education for the Handicapped, U.S. Office of Education; and the University of Wisconsin.

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I

INTRODUCTION

Peer teaching, defined as any interaction involving students tutoring other students, has become an increasingly popular educational technique. The basic idea of using students to help other students has been applied to groups ranging from kindergarten to college age. Various programs differ in characteristics of participants, instructional techniques, and immediate or long-term goals; but common to all programs is the assumption that positive changes in learning the substantive material and in social behavior do occur in the case of both tutors (students who teach) and tutees (students being taught).

Unfortunately, evidence for positive benefits from tutoring is largely anecdotal. Particularly intriguing is the possibility that tutoring may be especially helpful for the student serving as the tutor. Data supporting the hypothesis that tutors experience positive attitudinal change as a result of tutoring include the findings that they become aware of the personality and personal difficulties of their tutees, develop a more positive view of school, and increase their general sense of belonging and respect within the community (Gartner, Kohler, & Riessman, 1971). General positive behavioral changes in elementary school tutors have been noted by teachers. The marked improvement in tutors' academic performance has been attributed to their improved ability to organize and understand the material.

Eiseman and Lippitt (1966) reported observational data suggesting positive attitudinal changes in tutees: the children exhibited a greater interest in learning, more willingness to repeat work done poorly, improved self-confidence, more self-respect, better self-image, and more favorable attitudes toward family members, as well as more respect for others. Other behavioral changes were also noted, including better school attendance, less "fooling around," less stammering, and better grooming. Academically, the tutees did their homework, participated in class, and exhibited better study habits and spelling. Melaragno and Newmark (1968) provide additional evidence regarding improved academic performance. These investigators reported that a significant number of first-grade tutees, initially deficient in their understanding of ten concept words, demonstrated comprehension mastery of these words after being tutored by proficient first-grade students.

The results of one adequately controlled study of an ongoing tutoring program tended to corroborate these anecdotal findings concerning the positive effect of tutoring on both the tutors and the tutees. Cloward (1967) evaluated the "Homework Helper Program" in New York City, in which low-achieving adolescents tutored elementary school children in reading. Significant changes occurred in the reading achievement of both tutors and tutees, with tutees showing a mean gain of 6.2 months over a

five-month period as compared to the control group's gain of 3.5 months. Tutors showed an even greater gain in reading achievement, with a mean improvement over a seven-month period of 1.7 years greater than that of a control group.

Cloward also administered to both experimental and control tutor groups a 54-item questionnaire dealing with "attitudes toward school and school-related activities, educational and vocational aspiration, and social values [p. 23]." Although no significant differences were reported between the experimental and control groups, Cloward suggested that the tutors had such initially high aspirations, positive attitudes, and values that the tutorial experience could not have been expected to produce any measurable impact.

Objective evaluation of the effects of peer teaching has been hampered by absence of experimental research, a shortcoming that may be due partially to the lack of a consistent theoretical perspective. Application of a role theoretical analysis (Sarbin & Allen, 1968) to the study of peer teaching could, therefore, facilitate investigation in this area.

The basic premise of role theory is that social interaction requires the enactment of roles, i.e., sets of behaviors associated with certain social positions rather than with the individuals who occupy the positions. According to role theory, peer teaching requires the enactment of certain complementary roles by the two children involved. Consistent with the anecdotal evidence reported for peer teaching programs, the role theorist would predict that such role enactment should produce changes in self-concept, attitudes, cognitions, and behaviors in a direction congruent with role expectations. This hypothesis has been substantiated by empirical data collected in such diverse contexts as the factory (Lieberman, 1956) and the school (Waller, 1932).

In their statement of goals most peer teaching programs refer to the desirability of both attitudinal and behavioral changes for both tutors and tutees; a specific focus in one area or the other for either tutor or tutee is usually apparent, however. Programs devised by Harrison (1969) and by the Systems Development Corporation (Melaragno & Newmark, 1967), for instance, are directed primarily toward improving the tutees' academic performance. The central concern of the Cross-Age Helper Program (Lippitt & Lohman, 1965), on the other hand, is to produce positive attitudinal changes in both tutor and tutee. Difference in emphasis among programs is reflected in organization, procedure, and design. Some programs stress the training of tutors in specific techniques for transmitting information, whereas others emphasize various ways of facilitating the development of a positive affective relationship between tutor and tutee. Since the stated purpose of most peer teaching programs is the long-term improvement of students' school experiences, a comparison of the relative effectiveness of programs stressing information transmission and those stressing affective relationship would be useful.

Comparison of the informational and attitudinal components of tutoring programs is also theoretically important. Lieberman (1956) demonstrated conclusively that enactment of a new role leads to significant change in attitude. A further implication of Lieberman's study is that in order to affect attitudes the new role must be enacted with a minimal degree of competence. Competence depends upon such variables as clarity of role expectations, role-taking skill, and involvement in the role.

Peer teaching programs in which the transmission of specific information is the major goal specify relatively precise behaviors appropriate to teacher (tutor) and learner (tutee) roles, and thus provide quite clear role expectations. Programs in which older and younger students are expected to become "friends," on the other hand, provide participants with rather ambiguous definitions of role-appropriate behavior. In other contexts such unclear role expectations have resulted in poor role enactment (Bible & Brown, 1963; Bible & McComas, 1963; Gross, Mason, & McEachern, 1958; Torrance, 1954). Since incompetent role enactment is assumed to lead to significantly less attitudinal and behavioral change than competent role enactment, it can be predicted that the first kind of peer teaching program would be more effective in producing changes than the second. The same prediction could be made regarding optimal levels of role-taking skill and role involvement, since both dimensions are partially dependent on the clarity of expectations about the roles to be enacted.

The present paper reports two studies designed to investigate peer teaching techniques within a role theoretical framework. The primary purpose of both studies is to determine empirically the effects of peer teaching on attitudes and behaviors of both tutors and tutees. In addition, the studies were designed to compare the two approaches to peer teaching: emphasis on information transmission or on affective relationship.

Existing peer teaching programs differ on a wide variety of dimensions, any one of which may significantly influence outcomes. Since the present studies were essentially exploratory rather than definitive, and since our basic intention was to determine general rather than specific effects, it was decided to cover as broad a range of factors as possible. Thus, although the two studies used the same dependent measures for the most part, they differed on several dimensions.

Experiment I utilized third-grade students paired with fourth-graders, i.e., a minimal tutor-tutee age difference. The subject matter chosen for the tutoring material (reading) was closely related to classroom work and required relatively passive performance on the part of both the tutee and the tutor. The program lasted only two weeks and included two orientation sessions for the tutors and eight meetings between the tutor-tutee pairs. Experiment II paired first-grade students with fifth graders, a much greater age difference than in Experiment I. The subject matter used for the tutoring material (symmetry concepts) was unrelated to classroom work and required relatively active participation from both tutors and tutees. The program lasted for a longer period of time (six weeks) and included one orientation session followed by two meetings of the tutor-tutee pair each week.

It should be noted that the two studies cannot be legitimately compared, since they differed along several dimensions. We intentionally varied the several dimensions in an attempt to ascertain the generality of tutoring effects under a wide range of conditions: (1) massed versus distributed tutoring (every day or two days a week), (2) extended versus short period of tutoring (six weeks or two weeks), (3) small versus large age difference between tutor and tutee (one year or four years), (4) content related or unrelated to classroom work (reading or mathematical concepts), and (5) nature of the teaching task (active or passive involvement by the tutor).

In both experiments, an attempt was made to control for any consequences of tutoring that might be due to the mere interaction between children of different ages. A "friendship" control condition was used in which an older child interacted with a younger child on a friendly basis for the same amount of time as spent in the tutoring sessions, but without any actual teaching taking place. Other studies have not used this type of control group. It is possible that the beneficial effects of tutoring for the tutor might be due to his experiencing a satisfactory interaction with a person of a younger age. This type of "big brother" or "big sister" experience might increase the tutor's sense of responsibility and positive attitude toward school. In these studies we are especially interested in the possible consequences of tutoring on the tutor--both in terms of effects on school work and on attitudes toward self and school. Nevertheless, information will be collected from the children receiving the teaching--the tutees--as well as from the tutors.

II

EXPERIMENT I

In Experiment I the tutoring program lasted for only two weeks, but the pairs of children met every day during this period of time. So the tutoring sessions were massed, rather than interspersed with nontutoring days as is typically the case in tutoring programs. This short and massed procedure should severely test the limits of the effectiveness of tutoring. The total amount of time spent in tutoring was minimal. Moreover, the impact of the experience may be less when the sessions are massed within a short time rather than distributed.

As for age disparity, there is some reason to believe that more positive results might ensue for the tutor when his age is similar to that of the tutee. When teaching a child only slightly younger than himself, the tutor is not likely to have thoroughly mastered the material, so a review would be helpful to him. On the other hand, the tutor must be at least somewhat more competent on his material than his tutee in order to help the tutee at all. Accordingly, we selected a one-grade difference between the tutor and tutee for the first study. In this first study the content of the tutoring lessons was closely related to the material the younger children were studying in the classroom at the time (reading).

METHOD

Subjects

Subjects were 60 students (30 fourth graders and 30 third graders) in a public elementary school. Eighteen female and 12 male subjects were selected from each grade. The children were recruited by letters sent to parents asking for participants in a research study on tutoring. Each fourth-grade student (tutor) was randomly paired with a same-sex third-grade student (tutee), and each pair was randomly assigned to one of three experimental conditions. The same pair of students remained together throughout the tutoring program.

Experimental Conditions

There were three experimental conditions: (1) Peer Teaching, (2) Friendship, and (3) Control. Subjects in the peer teaching condition were actually engaged in tutoring another student, i.e., a fourth grader tutored a third grader. In the friendship condition, fourth-grade subjects were told they were to be "friends" with a third-grade

subject as part of a special program. Friendship condition dyads met for the same amount of time as peer teaching condition subjects. Subjects in the control condition received no special treatment. Ten 45-minute sessions were held on weekday mornings before school began for a two-week period. At the end of the two-week program, all subjects were given a set of dependent measures. The procedures used in the three conditions are described in more detail below.

Peer teaching condition. Tutors in the peer teaching condition participated in a total of 10 sessions over a period of two weeks. The first meeting was an orientation to the tutoring program. Tutors were told that they would be "junior teachers" and would teach material independent from their tutees' normal school work. They were given the teaching materials and the suggested lesson plans for each tutoring session. The experimenter stressed that tutors would have wide latitude in the method of teaching. Tutors were given a "journal" in which they were to write their opinions and impressions after each tutoring session and give a grade to their tutees.

Tutors met with their pupils on the following four school days. On the first day of the second week, tutors met with the experimenter to discuss any problems they were having and to review plans for subsequent tutoring sessions. The remaining four sessions again were spent in teaching. At the last tutoring session, tutors gave tutees a test on the content of the stories read during the lessons.

Tutees in the peer teaching condition received a brief orientation at the first experimental session. They were told that they would be taught reading lessons that differed from those given in their regular classrooms, and that the program was in no sense remedial. Following their orientation, tutees participated in a total of eight tutoring sessions conducted entirely by their fourth-grade tutors. At the last session, tutees were given a test on the content of the stories they had covered. The older children (fourth graders) were also given a "journal" to complete after each day's activities.

Friendship condition. Fourth-grade students acting as "friends" to third graders began the experiment with an orientation session. They were told to become friendly with the younger children, in the manner of older siblings. Possible conversational topics such as pets, family, and school were suggested to the fourth graders and they were told to take advantage of the games and crafts provided. The fourth graders were also given their journals and told to complete one page each day.

For the next four sessions, each fourth grader met with his or her third-grade "friend." At the sixth session the fourth graders met by themselves with the experimenter and talked about any problems or questions they had. The next four sessions were again spent in meetings between the pairs of fourth and third graders. Students in the friendship condition thus spent the same amount of time with a younger child as did peer teaching condition subjects.

Younger children (third graders) in the friendship condition first attended an orientation session, at which the experimenter explained that they would have an older "friend" as part of the special program. Third-grade students then met with the same fourth grader for eight sessions. These sessions were run entirely by the older children, congruent with the procedure in the peer teaching condition.

Control condition. No special treatment of any kind was given to students who were in the control condition. Control condition subjects were administered the dependent measures at the same time as subjects in the tutoring and friendship conditions.

Materials

Subjects in the peer teaching condition were given a third-grade reading textbook, a companion workbook with answers for the tutor, and a series of lesson plans, roughly based on a teaching schedule of one story completed during every two tutoring sessions. Subjects in the friendship condition were given a variety of recreational materials such as paints, crayons, checkers, and other games.

Dependent Measures

Interview and quasi-projective test. Subjects (tutors) in all conditions were interviewed individually using an open-ended, unstructured interview schedule. All subjects were asked about general attitudes toward school, teachers, and peers. Subjects in the two experimental conditions were asked additional specific questions regarding aspects of the experimental procedure. As part of the interview, each subject was shown a picture of a female adult with an older and younger girl and was asked to tell what was happening in the picture from the perspective of each of the characters. This quasi-projective test was designed to assess differences between experimental and control subjects in perception and differentiation of roles.

Objective measures. The objective dependent measures were administered to the entire third- and fourth-grade population of the school in which the study was conducted. In order to reduce any potential bias from demand characteristics, the measures were administered by persons who had no association with the experiment and the testing.

Three objective measures given were the school attitude questionnaire, teacher questionnaire, and ladder questionnaire. The school attitude questionnaire consists of 36 items dealing with schoolwork, self-concept, physical appearance, and subjects' perceptions of their peers' attitudes toward them. The teacher questionnaire consists of 22 items designed to assess subjects' expectations and opinions about the teacher role. Questions on both tests were answered on a Likert-type scale numbered from one to five. The ladder questionnaire included three items designed to measure self-concept and level of aspiration. For each question, a ladder with ten rungs was shown. The highest rung was marked with a hypothetical score of a person who was the best example of the trait in question, and the bottom rung with the worst example of the trait. On two of the items ("How hard to you try on schoolwork?" and "How helpful are you?"), subjects were told to mark their present, past, and future positions on the ladder in relation to the top and bottom rungs. Thus, the measure is a self-anchoring scale, based upon Cantril's (1965) "striving" scale. For the third item using the ladder scale ("How much do you know?"), subjects indicated their own position relative to students in the first, third, and sixth grades.

RESULTS

Tutees (third graders)

In this study we were particularly interested in the effect of tutoring on the tutors. But first, before looking at data for tutors, let us examine results for the third-grade students--the tutees.

Reading scores. To determine the effectiveness of the tutoring experience for the tutees, scores were calculated for the comprehension test administered by the tutor. Mean scores on this reading test was 79 percent correct, which differed significantly from chance ($p < .01$). Thus, the tutoring was effective in improving the tutees' reading performance.

Reactions to tutoring. Tutees were asked during the open-ended interview whether they had enjoyed being tutored, and 100 percent replied that they did. Only one subject said that he would not want to be a tutee in the future. It is clear that the peer teaching condition seemed to result both in success in learning the material and in favorable subjective reactions from the third graders who were taught by fourth-grade tutors. Interviews were also conducted with third-grade subjects who were assigned to the friendship condition (who did not receive any help in substantive academic material). Results of the interview showed that 100 percent of the subjects in the friendship condition said that they liked the program and would like to participate in such a program in the future. Thus, self-report data indicated that the friendship condition, too, had a favorable impact on the participants in terms of their personal satisfaction with the experience.

Attitude measures. On attitude scales given to all third-grade students, only one item showed a significant condition effect in a 3 x 2 analysis of variance using condition and sex as factors. This was the item, "I might like to be a teacher someday." Subjects in the peer teaching and friendship conditions agreed significantly more with the statement than control subjects ($F = 4.02$, $p < .03$). There were also some sex main effects and interactions on other items, but the results were inconsistent and will not be discussed.

Tutors (fourth graders)

Interview data. Subjects in the peer teaching and friendship condition were asked by interview whether they had liked being in the study. All subjects in the friendship condition and 88 percent in the tutoring condition said they had enjoyed participating. All subjects reported that they would like to take part in future programs. One-third of the tutors agreed that tutoring was "fun," and the same percentage liked the evaluative power they had been given. Some children in the friendship condition stated that they had liked planning for each meeting, while others said simply that the study was "fun." All experimental subjects said that they liked their younger partner; although most of the tutors (78 percent) said that they would rather teach a different child in the future, only 33 percent of the friends preferred a different partner. (This difference was not statistically significant, however.)

The question, "What have you learned from being in the experiment?" yielded a wide variety of responses. Tutors cited the difficulty of teaching and the necessity of planning the lessons. One tutor said that he found he could "be helpful to younger kids." A number of subjects in the friendship condition stated that younger children were less dissimilar from themselves and more capable than they had previously thought. One "friend" said, "I needed a younger friend--like someone to be a big brother to." In summary, the fourth-grade subjects in the two experimental conditions reported that they enjoyed being in the experiment.

All fourth-grade subjects were asked questions regarding their general impressions of teachers and schools. Responses were coded into discrete categories, but few systematic differences across conditions could be detected. When asked what a teacher does, subjects in the peer teaching and control conditions cited "teaching" and "helping" most often, and subjects in the friendship condition cited disciplining as a teacher's most frequent duty. There was a slight difference between conditions on the item "Would you like to be a teacher?" Sixty percent of the tutors replied affirmatively, as compared to 44 percent of the friends and 40 percent of the controls.

Examination of the mean number of school-related attributes that the subjects said they liked showed little difference among conditions, tutors averaging 3.6, friends 4.1, and controls 5.0. Teachers were mentioned as one thing liked by three subjects in the peer teaching condition, two subjects in the friendship condition, and three control subjects. A question on the number of disliked school-related attributes also showed few condition differences; the mean number of items disliked was 2.2 for tutors, 3.3 for friends, and 2.4 for controls. "Teacher" was mentioned as an aspect of school disliked by one tutor, one friend, and two controls.

In conjunction with the interview, each subject was shown a picture of a female adult with an older and a younger girl and was asked to tell a story about it. In all cases, the subjects' stories centered around a classroom, with the adult being identified as a teacher or librarian and the children as students. All but one subject in each condition regarded the two girls as being same-grade peers. In the stories which were exceptions, one girl was described as helping the other. Almost all subjects said that the girls were happy or in a good mood. The overall tone of each subject's story was also coded as being positive or negative. There were small condition differences; most experimental subjects' stories were positive in tone, and half the control subjects' stories were positive and half negative. This difference was not statistically significant.

Attitude scales. To test subjects' responses on the attitude scales, three levels of condition (peer teaching, friendship, and control) were crossed with two levels of sex (male or female) in an analysis of covariance, using achievement scores (Iowa comprehensive test results) as the covariate.

Four a priori scales were derived from the 37 items on the School Attitude Questionnaire: attitudes toward schoolwork, attitudes about physical appearance, self-concept, and subjects' inferences about what others thought of them. No significant condition effects were found on any scale in the analysis of covariance. There was a main effect

for sex on the "schoolwork" scale: females showed more positive attitudes than males ($F = 4.46$, $p < .05$). There were no condition x sex interactions. An examination of the means showed a trend in the opposite direction from that predicted; tutors seemed to show slightly less positive attitudes toward school and self than subjects in the other conditions.

Since there were no a priori grounds for combining responses to individual items into one overall scale on the Teacher Questionnaire, each of the 22 items was analyzed separately. The item regarding the importance of tests showed the only significant condition effect ($F = 3.04$, $p < .07$). There was also a sex main effect ($F = 13.23$, $p < .001$) and an interaction ($F = 4.13$, $p < .03$) on this item. Male subjects tended to favor tests less than female subjects, and subjects who had tutored were slightly less in favor of tests than non-tutors. No other item showed a condition effect even approaching significance. There were a few significant sex main effects and condition x sex interactions on other items, but there was no consistent pattern of results.

DISCUSSION

Although it appears from subjects' anecdotal reports that they enjoyed participating in the experimental program, there was little objective evidence that the tutoring resulted in any significant difference relative to the friendship and control conditions. Subjects reported that they liked meeting with a younger or older child, but their subjective reactions were not confirmed by any significant change in attitudes toward self, school, or teachers.

A number of possibilities can be suggested to explain the lack of differences between experimental and control subjects. A primary cause may have been the brevity of the experiment. One of the purposes of this experiment was to test the minimal effective period of time for obtaining results due to tutoring. A two-week period may be too short to produce any important effects. Changes in fundamental attitudes such as those relating to self-concept are unlikely to be easily changed, and eight one-half hour sessions with another child may be insufficient to be effective. Furthermore, it is possible that there was a certain lack of clarity in the role expectations for the older tutors and "friends." Harrison's (1969) study has indicated the importance of specifying quite precisely what behavior the student tutors should follow. Since experimental subjects had only two orientation sessions with the supervisor, relatively little was said regarding appropriate role behavior for tutors. The expected behavior of the tutors was left relatively unstructured. Thus, older subjects may have felt somewhat ill at ease and uncertain of themselves in enacting the roles assigned to them.

It is also possible that the use of reading stories as material for the tutoring sessions did not effectively involve the students in the enactment of the role. In most cases, tutors simply listened passively to their tutees read; little actual teaching on the part of the tutor was involved. There is the possibility, though somewhat more remote, that any kind of special school program such as this conveys

some elements of stigma associated with receiving remedial help. Thus, subjects may have thought they were participating in a program for less capable students and reacted against it. This is a most unlikely possibility, however, since subjects were all volunteers and seemed eager to be a part of the program.

One final explanation for the lack of differences on the structured measures of attitude can be suggested. Perhaps subjects actually did not enjoy participating in the experiment, and the self-report data were inaccurate. Such an explanation must be viewed as a viable one due to the possible operation of demand characteristics in the interview situation. But since the interviewers had not been connected with the tutoring program, there is little reason to think that subjects altered their answers in response to perceived demands from interviewers.

III

EXPERIMENT II

As noted earlier, the second study paralleled the first in that we used the same basic three-condition design and, in general, the same set of dependent measures. The second study differed in several respects from the first, however, in order to explore other dimensions along which tutoring programs can be organized. The second study was longer than the first, lasting for six weeks. The tutoring sessions were not massed in a day-to-day arrangement as in Experiment I, but were scheduled for three sessions a week (one orientation meeting and two teaching sessions). The age difference between tutor and tutee was quite large in this experiment, unlike the first study; we used fifth graders to teach first graders. And, finally, the material taught (mathematical concepts) was not covered in the curriculum of the regular classroom teaching.

METHOD

Subjects

Subjects were 45 first graders and 45 fifth graders from a public elementary school (24 girls and 21 boys from each grade). The two first-grade teachers and three of the four fifth-grade teachers in the school agreed to cooperate and subjects were randomly chosen from these teachers' classrooms. Each fifth-grade student was randomly paired with a same-sex student from the first grade. Eight female and seven male pairs were then randomly assigned to one of three experimental conditions.

Experimental Conditions

The experimental design consisted of three conditions: Peer Teaching, Friendship, and Control. In the peer teaching condition, fifth-grade tutors taught their first-grade tutees a series of lessons on symmetry concepts. Although tutors were instructed to be friendly with their tutees, the emphasis was on transmission of the content matter of the lessons. In the friendship condition, fifth-grade subjects met for the same amount of time with the experimenter and with their first-grade pair members as did subjects in the tutoring condition. Older children in the friendship condition were told to be "friends" with the first-grade children; their meetings consisted of planning and playing games

with their first-grade partners. Children in the control group attended their regular classes and never interacted as pairs; they merely completed the battery of dependent measures administered to all subjects at the conclusion of the study.

Peer teaching condition. Tutors in the peer teaching condition participated in a total of 13 sessions over a period of five weeks. Their first meeting was a one-half hour orientation to the tutoring program, during which the experimenter explained the program, described the students' roles as "junior teachers," and outlined the program schedule.

For the next five weeks, subjects met with the experimenter once a week for a training session and taught the younger child for two sessions each week. At the first session with the experimenter, tutors received their teaching materials and were told how to complete the star chart and the teacher's journal. During the latter part of this meeting, and at all subsequent training sessions, subjects received their lesson plans and learned the concepts used as materials for teaching their tutees that week.

Fifth-grade tutors met with their first-grade tutees for a total of 10 one-half hour sessions. Two teaching sessions each week occurred in designated rooms within the school during regular school hours. Any problems that arose in the teaching sessions were discussed at the training session that preceded each of the two tutoring meetings every week.

The first session for tutees was an orientation to the program at which only first-grade subjects were present. Their role in the program was explained, and it was stressed that they were chosen randomly rather than because of academic deficiencies. For five weeks following the orientation session tutees met twice a week with their tutors. They did not meet again with the experimenter.

Friendship condition. Students first met for a one-half hour orientation session with the experimenter. Their role as "friends" to their younger partners was described, and the program schedule was explained. For the next five weeks, the fifth-grade students attended one training session and two "friend" meetings per week. At the first training session, the fifth-grade subjects received their journals, learned how to complete them and, with the experimenter's help, constructed an "interview" to stimulate conversation between themselves and their first-grade friends. At subsequent training sessions, possible recreational activities and problems were discussed. At their meetings subjects played a variety of indoor and outdoor games and talked informally about topics of mutual interest.

Younger subjects first attended an orientation session, at which the experimenter explained that each of them would meet twice a week with a special older "friend." For the next six weeks, subjects met with their fifth-grade partners for two sessions per week and had no separate contact with the experimenter.

Control condition. Control subjects were administered the dependent measures only; they did not participate in any kind of special interaction with other children.

Materials

Subjects in the peer teaching condition were given a folder containing a Student Manual for Unit 14 of the Minnesota Mathematics and Science Teaching Project, Exploring Symmetrical Patterns. The folder also contained a Star Chart and an envelope of paper stars. After each lesson, tutors placed the number of stars they thought their tutees deserved in the appropriate space on the Star Chart. In addition, the folder included a Teacher's Journal in which tutors rated their enjoyment of the tutoring session, their own and their tutee's competence, and their general impressions after each tutoring session. Tutors were given a different lesson plan each week which covered the two lessons from the Minnesota manual to be taught during that week's tutoring sessions.

Subjects in the friendship condition were also given a folder containing a Friend's Journal, similar to the Teacher's Journal. A series of interview questions constructed by the fifth-grade students at their first orientation session was added to the folder prior to their first meeting with the first-grade children. During the course of the study, subjects were provided with recreational materials, such as checkers, tiddly winks, jigsaw puzzles, clay, crayons. basketballs, and kites.

Dependent Measures

Concept attainment. At the last tutoring session, subjects in the peer teaching condition completed a ten-item symmetry concept test to determine the level of concept mastery attained as a result of the tutoring sessions. The test was specially constructed for use in this experiment.

Objective measures. During the two weeks following the experiment, a battery of dependent measures was administered to subjects in all conditions. In order to reduce any possible response bias, these measures were administered by persons having no association with the experiment. No mention was made of the connection between the experiment and the testing.

Three of the objective measures given to fifth-grade subjects were identical to those administered in Experiment I: school attitude questionnaire, teacher questionnaire, and ladder questionnaire. First-grade subjects completed the ladder questionnaire and simplified versions of the school attitude questionnaire and the teacher questionnaire. Items on all three questionnaires were read aloud to first-grade subjects.

In addition, fifth-grade subjects in each condition completed a special program questionnaire eliciting information specific to that condition. First-grade subjects in the peer teaching and friendship conditions completed a simplified version of these questionnaires.

RESULTS

Tutees

Learning. Subjects in the tutoring condition were given a 10-item test on the symmetry concepts taught during the tutoring sessions. Results

showed a mean score of 16.73 (out of a possible 20), indicating that a significant amount of learning did occur ($F = 24.63$, $p < .001$).

Reaction to being tutored. On the special program questionnaire, 87 percent of the tutees agreed that their tutors had been good teachers. Subjects (tutees) in the first-grade friendship condition reacted very favorably to the program, with 93 percent agreeing that it was easy to find things to do with their older friends. They reported unanimously that their older friends had been fun to be with and had liked being their friends.

A 2 x 2 analysis of variance with two levels of sex and two levels of condition was performed on those items on the special program questionnaire common to both peer teaching and friendship conditions. A main effect for condition was found for only one item: friendship condition subjects were significantly more eager to have an older partner the following year than were peer teaching condition subjects ($F = 8.24$, $p < .01$). The same trend was evident on two marginally significant items, with friendship condition subjects liking their first-grade partners more ($F = 3.31$, $p < .08$) and having more friends who wanted to be in the program ($F = 3.03$, $p < .09$).

A significant sex main effect was found on two items, with females having more friends who wished they were in the program ($F = 9.63$, $p < .005$) and expressing a greater desire to be in the program the following year ($F = 4.73$, $p < .03$) than males. Only on one item was there a marginally significant sex by condition interaction effect. Regarding the feelings of friends about being in the program, females in both conditions were unanimously positive, while friendship condition males were more positive than peer teaching condition males ($F = 3.47$, $p < .07$).

These results indicate that although the peer teaching condition was effective in producing objective learning gains for the tutees, children in the friendship condition found the program subjectively more satisfying. In addition, a tendency was apparent for females to be more favorable toward involvement in a special program than males, regardless of condition.

Attitudes about school. An analysis of variance was performed on data from the school attitude questionnaire, using two levels of sex and three levels of condition (peer teaching, friendship, and control) in the analysis. Items on the questionnaire were analyzed separately. Significant main effects for condition were found on five items. Subjects in the tutoring condition responded more favorably to two statements: "Mostly I have good ideas" ($F = 3.26$, $p < .05$) and "My teacher often asks me to do things for her in the classroom" ($F = 3.45$, $p < .05$). Control condition subjects, equaled or followed closely by friendship condition subjects, were significantly more positive than peer teaching condition subjects in agreeing that they were mostly happy in school ($F = 6.72$, $p < .01$), that they were happy people ($F = 4.35$, $p < .02$) and that they liked to do schoolwork ($F = 4.03$, $p < .02$). Finally, friendship condition subjects scored most positively on two marginally significant items. They felt that they were tall enough ($F = 3.01$, $p < .06$) and that most people were easy for them to get along with ($F = 3.01$, $p < .08$).

These results can be summarized by saying that although the number of items showing significant differences among conditions was too small

to permit broad conclusions, the data are suggestive in that the items to which peer teaching condition subjects responded most positively were self-judgments of intellectual and school-related competence. By contrast, the affirmative responses of both friendship and control condition subjects were basically affective reactions to self, school, and others. Thus, the externally validated demonstration of competence provided in the peer teaching condition may have improved the tutees' self-concepts in those areas for which the experience was directly relevant.

Significant and marginally significant main effects for sex were reported on several items. More female than male subjects across all conditions liked to work with other children in school ($F = 6.16$, $p < .01$) and were mostly happy in school ($F = 5.88$, $p < .02$). A similar trend was evident for the item, "I'm proud of me" ($F = 3.67$, $p < .06$). Male subjects were significantly more positive than females in stating that they were pretty strong ($F = 35.00$, $p < .0001$) and pretty brave ($F = 9.71$, $p < .003$). Males were marginally more affirmative than females in agreeing that mostly they had good ideas ($F = 3.02$, $p < .09$) and that students in their classes thought they had important things to say ($F = 3.28$, $p < .08$).

These male-female differences seem relatively consistent with the instrumental-expressive sex-role dichotomy discussed by Brim (1958). Items on which females were most positive dealt with social skills and affective judgments of self. On the other hand, males responded more positively to statements regarding the possession of typically "male" characteristics of strength and bravery and those requiring self-judgments of intellectual achievement.

Only one item, "The students in my class think I have important things to say," indicated a significant interaction effect between sex and condition ($F = 4.78$, $p < .04$). Four marginally significant items were: "I'm good in schoolwork" ($F = 2.30$, $p < .07$), "Teachers like me most of the time" ($F = 2.77$, $p < .07$), "I like to work with other children in school" ($F = 2.70$, $p < .08$) and "I'm very shy" ($F = 2.74$, $p < .08$).

Examination of these significant and marginally significant sex by condition interactions reveals a relatively consistent response pattern for both male and female subjects. Excluding those items on which all female groups were unanimously positive, friendship condition females were always the most positive, and control condition females the most negative. Peer teaching condition females were as positive as friendship condition females in agreeing that they were good in schoolwork, and they scored between the other two groups on the other items. Consistency among male subjects was in a direction opposite to that among females. On four of five items, control condition males were most positive and friendship condition males were least positive in response to three of the five statements. Peer teaching condition males were variable, being least positive on two items, identical to control condition males on two items, and slightly more positive than the control group on one item.

These data are only suggestive at best. Extrapolating from all the significant results on this questionnaire, it would seem that females are predisposed to enjoy any special school program and males are predisposed to dislike it. The friendship condition gives females the greatest opportunity to use expressive, sex-role congruent aspects of

self in which they are most confident and which they receive the most positive reinforcement. Tutoring condition males may have been less negative toward the special program for the same reasons: this condition is more congruent with male sex-role expectations than is the friendship condition, although being left alone is most preferred.

Attitudes about teachers. Significant main effects by condition were found on three items, with subjects in the peer teaching condition agreeing most strongly that "It is easy to learn by yourself, without a teacher" ($F = 3.32$, $p < .05$). Subjects in the friendship condition felt most positively that a teacher should give many grades ($F = 3.34$, $p < .05$) and that tests were important ways of finding out if students had learned anything ($F = 4.56$, $p < .02$). Perhaps friendship condition subjects responded as they did because their experience had made them more sensitive than other subjects to the difference between the roles of teacher and friend.

A consistent but confusing pattern was apparent on the marginally significant condition main effect results on four items, with the control condition subjects being most positive, followed by peer teaching condition subjects. Two of these items would be expected to be correlated: "I might like to be a teacher someday" ($F = 3.03$, $p < .06$) and "I would be happy as a teacher" ($F = 2.69$, $p < .08$). The other two items were clearly contradictory, however: "Teachers should be very strict" ($F = 2.58$, $p < .09$) and "A teacher should always let students do what they want" ($F = 2.96$, $p < .06$).

Analyses of variance on the items indicated that male subjects in all conditions agreed significantly more than females that it was easy to learn by themselves, without a teacher ($F = 8.54$, $p < .005$), that teachers should be men ($F = 21.66$, $p < .0001$), that teachers were happier teaching smart kids than "not so smart" kids ($F = 6.48$, $p < .01$), that it was easy for a teacher to make up tests ($F = 15.16$, $p < .0004$) and that a teacher should punish students ($F = 4.55$, $p < .04$). On only one item did girls indicate more positive feelings than boys ("I might like to be a teacher someday") and only at a marginally significant level ($F = 3.09$, $p < .08$). With the exception of one item, "Teachers of children should be men," those statements to which males responded more positively than females seem to reflect a perception of the teacher as relatively distant and detached, enacting a role with which there is little desire to identify.

There were no significant sex by condition interactions, although four items were marginally significant: "I might like to be a teacher someday" ($F = 3.00$, $p < .06$), "A teacher should give many grades" ($F = 2.92$, $p < .06$), "A teacher should punish students" ($F = 3.07$, $p < .06$), and "A teacher should treat everybody the same way" ($F = 3.09$, $p < .05$). Examination of group means revealed no discernible pattern to these results.

Ladder questionnaire. A significant condition main effect was apparent on one item, "How helpful are you?--Put an X at the place in the ladder where you think you will be next year." Peer teaching condition subjects placed themselves significantly lower ($F = 3.88$, $p < .03$) than did friendship or control condition subjects. A similar tendency was evident on the item, "How hard do you try in your schoolwork?--Put an X at the place in the ladder where you think you will be

next year" ($F = 2.95$, $p < .06$). Perhaps participation in the peer teaching condition made the tutees' feel more inadequate, since their role performance was more demanding than that of friendship condition subjects.

There were no significant sex main effects, and a sex by condition interaction trend was indicated on only one item: "How much do you know?--Put one X at the place in the ladder where you are" ($F = 2.76$, $p < .07$). Among females, those in the peer teaching condition were most positive, with control and friendship condition females being less positive. Male control condition subjects were most favorable, followed by those in the friendship condition, with peer teaching condition males being least positive of all groups. Given only one marginally significant item, no interpretations of its meaning can legitimately be made.

Teacher evaluation form. Analysis of variance of the overall mean indicated a tendency for teachers to view females more favorably than males on the personality dimensions included in this test ($F = 3.12$, $p < .08$). There were no significant condition or sex by condition effects.

Tutors (fifth graders)

Subjects in the peer teaching condition attained a mean score of 18.80 out of a possible 20 in the symmetry test administered at the last tutoring session, thus demonstrating their own mastery of the concepts they had taught. On those items on the special program questionnaire unique to their condition, two-thirds of the subjects agreed completely that their students had paid attention well. Tutors were slightly less emphatic in judging the symmetry lessons as too easy for their students, although no subject disagreed beyond the neutral point. Subjects were even less positive on the item pertaining directly to their own attitudes toward teaching, with males somewhat less favorable than females. Friendship condition subjects were lukewarm rather than enthusiastic in agreeing that their younger friends had been interesting and that it was easy to think of things to do with their younger friends.

Analysis of variance by sex and condition was performed on those special program questionnaire items common to both peer teaching and friendship condition subjects. A significant difference between conditions was apparent on one item: peer teaching condition subjects agreed more than friendship condition subjects that they would like to be in the program the following year ($F = 4.61$, $p < .04$). Peer teaching condition subjects were also more positive on two marginally significant statements: "Many of my friends wish they could be a first grader/junior student, too" ($F = 3.07$, $p < .09$), and "I liked my first-grade friend/student" ($F = 3.00$, $p < .09$). Of the peer teaching condition subjects, 57 percent reported they would like to be older friends. Friendship condition subjects were more divided, with 47 percent wishing to be older friends again, 20 percent wanting to be junior teachers and 33 percent preferring to be friends with older children.

These data indicate that neither of the experimental conditions had as strong a positive effect on the fifth-grade subjects as it had on their first-grade partners. This finding may be partly attributed to the fact that fifth-grade subjects had five-choice responses while

first-grade subjects were limited to two-choice decisions. It would seem that although subjects in the peer teaching condition demonstrated objective learning gains and were subjectively more positively affected by their participation in the program than were friendship condition subjects, neither group was overwhelmingly enthusiastic.

Attitude questionnaire. A 3 x 2 analysis of covariance was performed on data from the three questionnaires completed by all subjects in all conditions. The factors analyzed were two levels of sex and three levels of condition; the covariate was the average report card grade received by each child on all school subjects over three academic quarters.

Prior to the analysis of covariance, a reliability check was conducted on the a priori subscales constructed by the experimenter. Those items comprising reliable subscales were analyzed as such. The remaining items were analyzed individually. No significant main effects for condition were found on either the subscales or the individual items. A marginally significant difference occurred on one item: friendship condition subjects agreed most positively that students in their classes thought what they had to say was important, while peer teaching condition subjects were least positive ($F = 2.74$, $p < .08$).

Significant main effects for sex were evident on three subscales and five individual items. Males consistently exhibited a more favorable self-concept than females on the Self-General subscale, designed to measure general self-concept ($F = 5.19$, $p < .03$), on the Self-Physical subscale ($F = 8.79$, $p < .005$) and on the Self-Other subscale, measuring self-concept in relation to other people ($F = 7.64$, $p < .008$). Males were also more positive than females in their evaluation of their strength ($F = 7.86$, $p < .008$), their lack of shyness ($F = 4.37$, $p < .04$), their ability in class discussions ($F = 6.35$, $p < .01$) and the frequency with which teachers asked them to do things for them in the classroom ($F = 5.35$, $p < .02$). Males were also more confident that they worked well with others in school, although only at a marginally significant level ($F = 3.47$, $p < .07$). On only one item were females significantly more positive than males; they enjoyed being around younger children more ($F = 4.82$, $p < .03$).

A significant sex by condition effect occurred on one item, personal strength ($F = 3.38$, $p < .44$), while a marginally significant ($F = 2.81$, $p < .07$) interaction was apparent on the item, "The students in my class think what I have to say is important." Examination of the means reveals no interpretable pattern.

Attitude about teachers. No significant or marginally significant condition main effects were reported for any item from this questionnaire. Significant sex main effects occurred on three items: females agreed significantly more than males that they might like to be teachers someday ($F = 4.76$, $p < .03$) and also, at a marginally significant level, that teachers are happier teaching smart kids than "not so smart" kids ($F = 3.03$, $p < .09$). Not surprisingly, males were significantly more emphatic than females in the judgment that teachers should be men ($F = 7.25$, $p < .01$). They also felt more strongly that a teacher should not be much older than the students ($F = 5.27$, $p < .03$). At a marginally significant level, males were more positive in thinking that a teacher should treat everyone the same way ($F = 3.27$, $p < .08$).

Two items demonstrated a significant sex by condition interaction effect. On the item "Teachers are happier teaching smart kids than not so smart kids" ($F = 3.74$, $p < .03$), peer teaching condition males and both friendship condition and control condition females were positive, control condition males and peer teaching condition females were neutral, and friendship condition males disagreed. On the second significant item, "A teacher should always let students do what they want" ($F = 3.40$, $p < .04$), only control condition males and friendship condition females agreed, with control condition females being most negative. One item was marginally significant ($F = 2.74$, $p < .08$): "School would be a better place if teachers taught each student alone, without a class." Only control condition males reacted neutrally to this statement; all other groups disagreed and peer teaching condition males were most negative.

Ladder questionnaire. Subjects in the peer teaching and friendship conditions had significantly lower self-concepts than control subjects on one item: "How much do you know?" ($F = 3.31$, $p < .05$). A trend for friendship condition subjects to be more negative about themselves than either control or peer teaching condition subjects was evident on one statement, "How hard do you try in your schoolwork?" ($F = 2.47$, $p < .10$). Females had a significantly less favorable opinion of third-grade children than males ($F = 6.62$, $p < .01$) on the item, "How much do you know?" A similar trend was evident on the same item for subjects' opinion of first graders' knowledge ($F = 3.19$, $p < .08$).

A significant sex by condition effect ($F = 4.69$, $p < .01$) was noted only on "How helpful are you? Put an X at the place in the ladder where you think you will be next year." (Male means: control = 1.14, friendship = 2.14, peer teaching = 2.43; female means: peer teaching = 1.25, friendship = 2.00, control = 2.37.)

DISCUSSION

The first-grade subjects' (tutees') data indicated, first, that those in the peer teaching condition experienced significant objective learning gains. Second, participation in the study was subjectively more enjoyable for friendship condition subjects than for those in the peer teaching condition. Finally, other self-report results, although suggestive rather than conclusive, tended to support predictions. Peer teaching condition subjects differed significantly from children in the other two conditions on items involving judgments of intellectual and school-related performance, which indicates a heightened awareness of student role components. Participation in the friendship condition, however, apparently served only to emphasize those aspects of the teacher role most clearly differentiating it from that of student or friend; subjects' attitudes toward self and peers remained unchanged.

A more detailed examination of the data for tutees revealed certain apparent inconsistencies with role theory hypotheses that should be discussed. Although subjects in the friendship condition experienced little attitude change, self-report questionnaire data showed that they enjoyed participating in the study more than peer teaching condition subjects. The greater attitude change experienced by peer teaching condition

subjects suggests that they were more involved in their role, received more direct feedback than friendship condition subjects, and demonstrated a relatively high level of competence in role enactment. From a role theory perspective, therefore, the opposite result should have occurred: subjects in the peer teaching condition should have enjoyed participating in the study more than friendship condition subjects.

Friendship condition subjects, placed in a loosely defined interactional situation similar to that experienced with older siblings, may not have been aware, however, that they were enacting a specific role. If this were the case, neither significant attitude change nor subjective feelings of disappointment due to inadequate role enactment could be expected to occur. Both positive and negative effects of role enactment depend to a certain extent on the actor's awareness of role requirements and rewards. This explanation is consistent with the finding that attitudes of subjects in the peer teaching condition were significantly more negative on the ladder questionnaire than in the other conditions. Items dealing with enactment of the student role did not indicate more positive self-concepts for tutees. Positive attitude change occurred only on those self-concept items dealing with areas directly related to performance of the student role. This lack of generalization could be due to the relatively short duration of the experiment.

Results for fifth-grade subjects (tutors) were generally disappointing. Subjects in the peer teaching condition undoubtedly made significant learning gains. Children in this condition also enjoyed participating in the study more than friendship condition subjects, although neither condition was very positive. A significant condition effect occurred on only one item of all the objective questionnaires, in a direction contrary to the experimenters' predictions. On the ladder questionnaire item, "How much do you know?," control subjects were significantly more positive than those in the experimental conditions.

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